

We claim:

1. A process for producing a 1-butene-containing C₄-hydrocarbon stream (1-C₄= stream) from a 1-butene- and 2-butene-containing C₄-hydrocarbon stream (1- and 2-C₄= feed stream) whose 1-butene content is lower than that of the 1-C₄= stream, by
 - a) feeding the 1- and 2-C₄= feed stream and a 1-butene- and 2-butene-containing C₄-hydrocarbon stream (1- and 2-C₄= recycle stream) whose 1-butene content is lower than that of the 1-C₄= stream and which has been produced by means of step (b) below into a distillation column and taking off the 1-C₄= stream and a 2-butene-containing C₄-hydrocarbon stream (2-C₄= stream) whose 1-butene content is lower than that of the 1- and 2-C₄= feed stream and of the 1- and 2-C₄= recycle stream from the distillation column (step a) and
 - b) producing the 1- and 2-C₄= recycle stream from the 2-C₄= stream by bringing the 2-C₄= stream into contact with an isomerization catalyst which catalyzes the conversion of 2-butenes into 1-butene in a reaction zone (step b).
2. A process as claimed in claim 1, wherein a 1- and 2-C₄= feed stream in which the ratio of 2-butenes to 1-butene is from 6:1 to 0.1:1 is used.
3. A process as claimed in either of the preceding claims, wherein a 1- and 2-C₄= feed stream containing a maximum of 5% by weight of multiply unsaturated compounds or alkynes is used.
4. A process as claimed in any of the preceding claims, wherein a 1- and 2-C₄= feed stream in which the content of butenes is from 30 to 100% by weight is used.
5. A process as claimed in any of the preceding claims, wherein the distillation column has from 30 to 80 theoretical plates and is operated at a reflux ratio of from 10 to 50.
6. A process as claimed in any of the preceding claims, wherein the 1-butene content, based on the sum of 1-butene and 2-butenes in the 1-C₄= stream, is from 80 to 99.99%.
7. A process as claimed in any of the preceding claims, wherein the 1-C₄= stream comprises

- from 60 to 99.99% by weight of 1-butene and 2-butenes and
 - from 0.01 to 40% by weight of compounds selected from the group consisting of butadienes, isobutane, n-butane and isobutene.
- 5
8. A process as claimed in any of the preceding claims, wherein the 2-C₄⁻ stream is taken off in the lower fifth of the distillation column.
- 10 9. A process as claimed in any of the preceding claims, wherein the content of 2-butenes in the 1- and 2-C₄⁻ recycle stream has been reduced by from 5 to 30%, based on its content in the 2-C₄⁻ stream.
- 15 10. A process as claimed in any of the preceding claims, wherein a substream (C₄⁺) consisting essentially of 1-butene, 2-butenes, n-butane and hydrocarbons having 5 and more carbon atoms is taken off at the bottom of the distillation column.
- 20 11. A process as claimed in any of the preceding claims, wherein the temperature in the reaction zone of step b is from 200 to 500°C and the pressure is from 1 to 20 bar.
- 25 12. A process as claimed in any of the preceding claims, wherein the conversion of 2-butenes into 1-butene, based on the content of 2-butenes in the 1- and 2-C₄⁻ feed stream, is from 70 to 99%.
13. A process as claimed in any of the preceding claims, wherein a 3-hexene-containing stream is prepared from the 1-C₄⁻ stream by bringing the 1- C₄⁻ stream into contact with a metathesis catalyst at from 20 to 350°C.
- 30 14. A process as claimed in any of the preceding claims, wherein the 1-C₄⁻ stream is freed of multiply unsaturated compounds and alkynes by subjecting it to a selective hydrogenation in the presence of a palladium-containing catalyst, in which virtually no conversion of 1-butene into 2-butenes occurs.